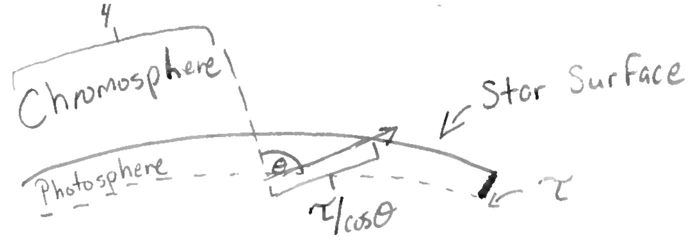
2/6/15

Paul Ellison



$\langle\tau\rangle = \frac{2}{3}$]-3

Differing wavelegths are absorbed at different optical depths in relation to their wave legth.

$F = \sigma T^4$

Temperature (Rough Model)

$T(\tau) = T_{eff} \sqrt[4]{\frac{3}{4}\tau + \frac{1}{2}}$

Ex.

$\tau = \frac{2}{3} \rightarrow T(\tau) = T_{eff}$

$F_{observed} = \sigma T_{eff}^4$

For the sun 5800K @ $\frac{2}{3}\tau$ Not the surface

Stuff introed last class

$\bar{K}$ - opacity

ρ - density

$\Delta x \cdot \rho \cdot \bar{K} = \tau$]-1

Ex.

$\rho = 0.2 \times 10^{-3}\ kg/m^3$]-2

$K_{500nm} = \frac{0.03}{kg/m^2}$

$\tau = 1 \Leftrightarrow 140\,km$]-5

6-[ρ_i - H, He, He^+, He^{++}, e^-, γ + 'metals'

T - temp , P_i - pressure

$P_{tot} = \sum_i P_i$

Relativistic Objects

only Photons - γ_i

$P_\gamma = \frac{1}{3} u_i$ *

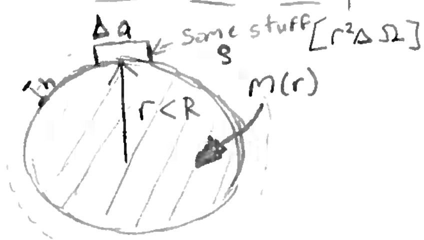
Non-Relativistic objects

$P_i = n_i k T \qquad PV = NRT$ ($\frac{N}{V}$; $n_i / 6\times10^{23}$)

Ideal gas law

Energy Density

$u_i = n_i \frac{3}{2} kT \Rightarrow P_i = \frac{2}{3} u_i$ *



$F_{grav} = -G \frac{m(r)\cdot\rho\cdot\Delta h\cdot\Delta a}{r}$

$F_p = P_{below} \cdot \Delta a - P_{above} \cdot \Delta a$

$P_{above} - P_{below} = G \frac{m(r)\cdot\rho\cdot\Delta h}{r}$

$\Delta P = P_{ab} - P_b \rightarrow \frac{\Delta P}{\Delta h} = -G \frac{m(r)\cdot\rho}{r}$

always < 0 ⇒ pressure always increases towards smaller (center)

Center of Sun

$15 \times 10^6\,K = T$

1: optical Depth

2: @ Sun's Photosphere

3: effective observable optical depth

4: Temperature much higher than the photosphere but isn't very dense

5: All light observed at 1 optical depth or less.

6.) $\frac{N_i}{vol} \cdot m_i$ - weight density

$\frac{N_i}{vol} \cdot n_i$ - number density

* Pay attention to later